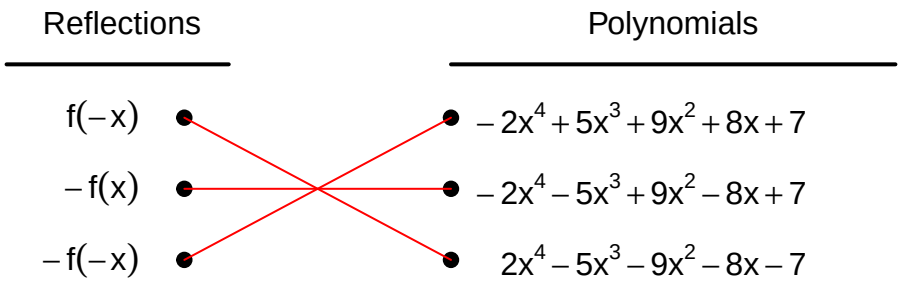
Name: Date:

Exam: Function Reflections (Solution version 621)

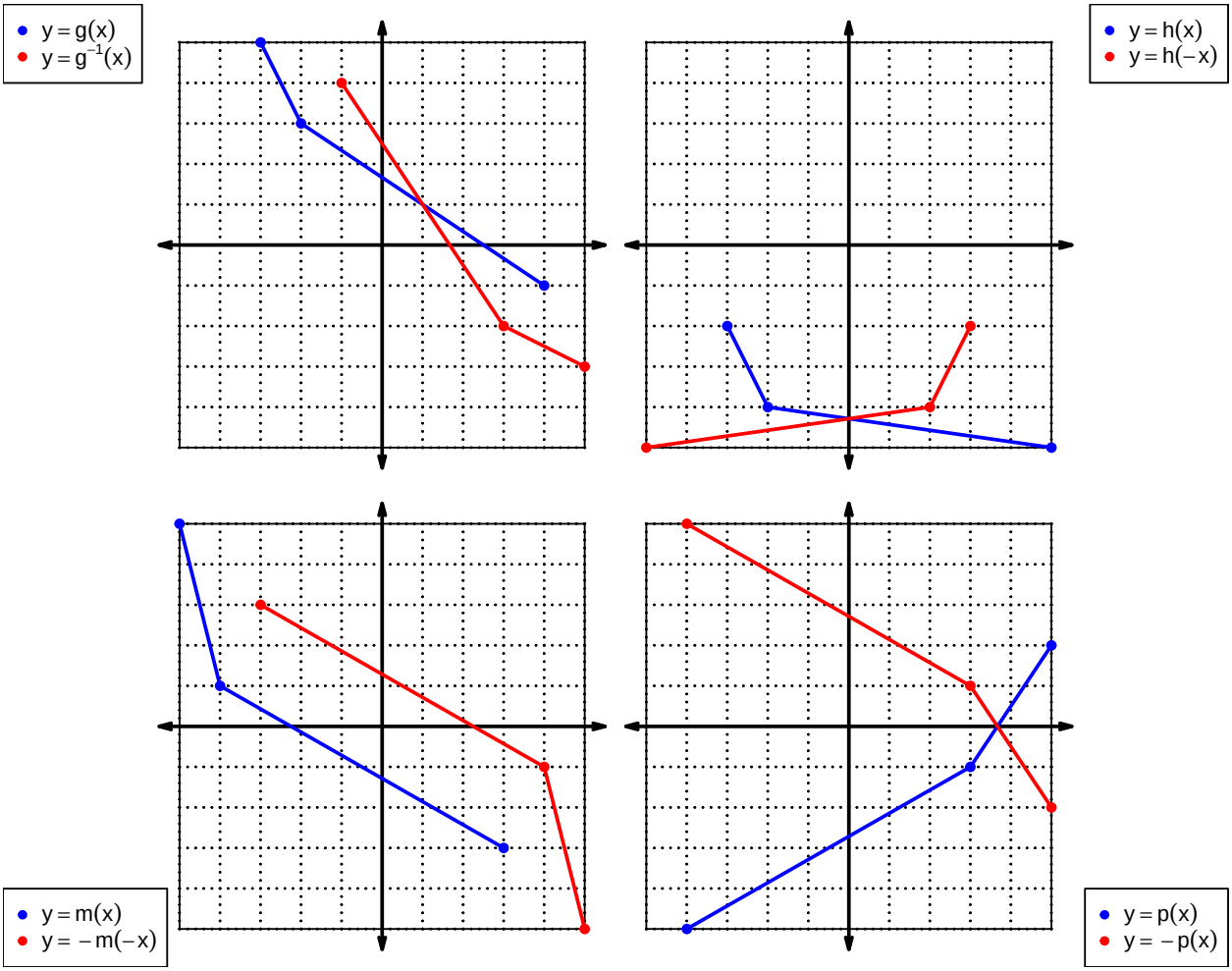
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = 2x^4 + 5x^3 - 9x^2 + 8x - 7$$

Draw lines that match each function reflection with its polynomial:



2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	8	3	5
2	4	2	1
3	9	4	7
4	1	7	6
5	3	6	9
6	5	9	3
7	6	8	2
8	2	5	4
9	7	1	8

3. (worth 3 points) Evaluate $h(5)$.

$h(5) = 9$

4. (worth 3 points) Evaluate $g^{-1}(7)$.

$g^{-1}(7) = 4$

5. (worth 3 points) Assuming h is an **odd** function, evaluate $h(-6)$.

If function h is odd, then

$h(-6) = -3$

6. (worth 3 points) Assuming f is an **even** function, evaluate $f(-1)$.

If function f is even, then

$f(-1) = 8$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) \;=\; x^2 - 1$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; (-x)^2 - 1$$
$$p(-x) \;=\; x^2 - 1$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(x^2 - 1\right)$$
$$-p(-x) \;=\; -x^2 + 1$$

c. Is polynomial p even, odd, or neither?

even

d. Explain how you know the answer to part c.

We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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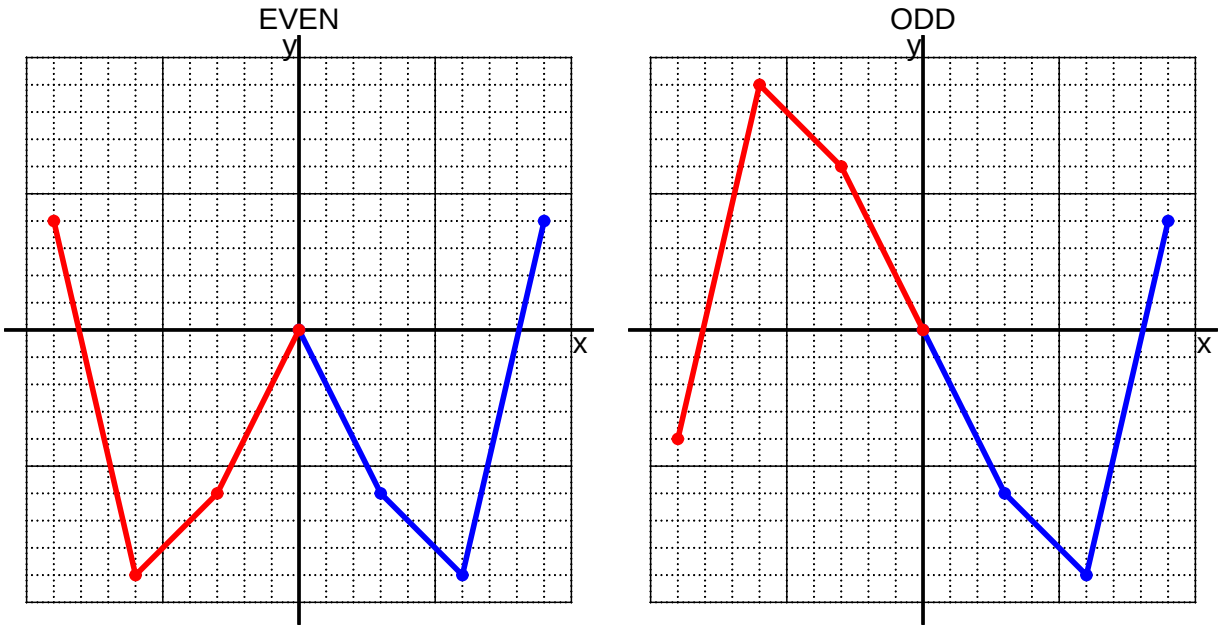
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = \frac{x+7}{2}$$

a. Evaluate $f(55)$.

step 1: add 7
step 2: divide by 2

$$f(55) = \frac{(55)+7}{2}$$
$$f(55) = 31$$

b. Evaluate $f^{-1}(47)$.

step 1: multiply by 2
step 2: subtract 7

$$f^{-1}(x) = 2x - 7$$
$$f^{-1}(47) = 2(47) - 7$$
$$f^{-1}(47) = 87$$

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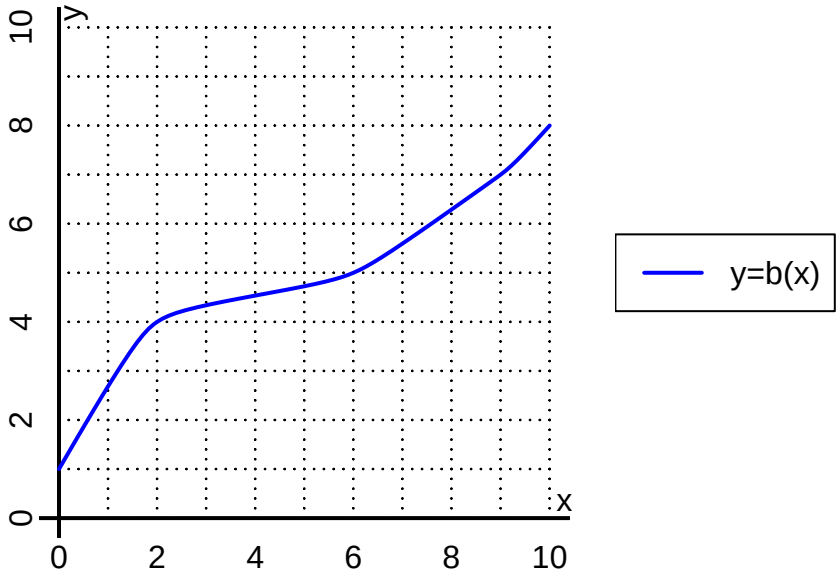
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(9)$.

$b(9) = 7$

b. Evaluate $b^{-1}(4)$.

$b^{-1}(4) = 2$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	9	-9	-9	9
-1	-4	4	4	-4
0	0	0	0	0
1	4	-4	-4	4
2	-9	9	9	-9

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.